

WE CLAIM:

1. Apparatus for processing data, said apparatus comprising:

5 a plurality of trace data sources operable to generate respective individual trace data streams carrying trace data;

a trace data selector operable to select one of said individual trace data streams as a selected trace data stream for output; and

10 a trace data formatter operable to format said selected trace data stream to form an output trace data stream, wherein

said trace data formatter is operable to detect which of said individual trace data sources is selected by said trace data selector and to insert a trace data source identifier in said output trace data stream in response to a change of trace data source selected by said trace data selector.

15 2. Apparatus as claimed in claim 1, wherein said selected trace data stream includes a trace data source identifier with every packet of trace data.

20 3. Apparatus as claimed in claim 1, wherein said trace data formatter is operable to insert said trace data source identifier at a predetermined source identifier position within said output trace data stream.

25 4. Apparatus as claimed in claim 3, wherein said predetermined source identifier position contains trace data when said trace data source identifier is not inserted.

5. Apparatus as claimed in claim 4, wherein a flag at a predetermined flag position within said output trace data stream indicates whether said predetermined source identifier position contains:

(i) said trace data source identifier; or

30 (ii) trace data.

6. Apparatus as claimed in claim 3, wherein when said predetermined source identifier position contains said trace data source identifier, then a further predetermined position within said output trace data stream contains a position flag

indicating where trace data for said trace data source identified by said trace data source identifier starts within said output trace data stream.

7. Apparatus as claimed in claim 6, wherein when said trace data source identifier is not inserted, said predetermined source identifier position contains trace data and said further predetermined position contains trace data.

8. Apparatus as claimed in claim 1, wherein said output trace data stream is formatted into data frames, each data frame comprising:

- 10 a plurality of predetermined positions respectively containing one of:
- (i) a trace data source identifier; and
 - (ii) trace data; and
- a plurality of predetermined positions containing trace data.

15 9. Apparatus as claimed in claim 8, wherein each data frame includes a flags portion containing at least one of:

(i) one or more position flags indicating respective start positions of trace data within said frame associated with trace data source identifiers within said data frame; and

20 (ii) trace data.

10. Apparatus as claimed in claim 1, wherein said trace data formatter is operable to insert a trace data source identifier having a reserved synchronisation value as a synchronisation marker within said output trace data stream.

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11. Apparatus as claimed in claim 1, wherein said trace data formatter is operable to insert a trace data source identifier having a reserved null value as a null value marker within said output trace data stream indicative of said output trace data stream containing null values.

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12. Apparatus as claimed in claim 1, wherein said output trace data stream is directed from said trace data formatter to one of:

- (i) one or more real time trace outputs of an integrated circuit; and
- (ii) a trace data buffer memory of an integrated circuit.

13. Apparatus as claimed in claim 1, wherein said trace data source identifier inserted in said output trace data stream by said trace data formatter comprises a reserved sequence that is distinguishable from any trace data sequences associated with said selected trace data stream in said output trace data stream.

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14. Apparatus as claimed in claim 13, wherein said trace data formatter is operable to detect an occurrence of a trace data sequence corresponding to said reserved sequence in at least one of said individual trace data streams and upon detection of said reserved sequence, said formatter also being operable to modify said trace data sequence to distinguish it from said reserved sequence in said output trace data stream.

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15. A method of generating trace data, said method comprising the steps of:
generating with a plurality of trace data sources respective individual trace data streams carrying trace data;

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selecting one of said individual trace data streams as a selected trace data stream for output; and

formatting said selected trace data stream to form an output trace data stream, wherein

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said formatting includes detecting which of said individual trace data sources is selected and inserting a trace data source identifier in said output trace data stream in response to a change of said selected trace data source.

16. A method as claimed in claim 15, wherein said selected trace data stream includes a trace data source identifier with every packet of trace data.

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17. A method as claimed in claim 15, wherein said trace data source identifier is inserted at a predetermined source identifier position within said output trace data stream.

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18. A method as claimed in claim 17, wherein said predetermined source identifier position contains trace data when said trace data source identifier is not inserted.

19. A method as claimed in claim 18, wherein a flag at a predetermined flag position within said output trace data stream indicates whether said predetermined source identifier position contains:

- (i) said trace data source identifier; or
- 5 (ii) trace data.

20. A method as claimed in claim 17, wherein when said predetermined source identifier position contains said trace data source identifier, then a further predetermined position within said output trace data stream contains a position flag
10 indicating where trace data for said trace data source identified by said trace data source identifier starts within said output trace data stream.

21. A method as claimed in claim 20, wherein when said trace data source identifier is not inserted, said predetermined source identifier position contains trace
15 data and said further predetermined position contains trace data.

22. A method as claimed in claim 15, wherein said output trace data stream is formatted into data frames, each data frame comprising:

a plurality of predetermined positions respectively containing one of:

- 20 (i) a trace data source identifier; and
- (ii) trace data; and

a plurality of predetermined positions containing trace data.

23. A method as claimed in claim 22, wherein each data frame includes a flags
25 portion containing at least one of:

(i) one or more position flags indicating respective start positions of trace data within said frame associated with trace data source identifiers within said data frame; and

(ii) trace data.

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24. A method as claimed in claim 15, wherein a trace data source identifier having a reserved synchronisation value is inserted as a synchronisation marker within said output trace data stream.

25. A method as claimed in claim 15, wherein a trace data source identifier having a reserved null value is inserted as a null value marker within said output trace data stream to indicate that said output trace data stream contains null values.

5 26. A method as claimed in claim 15, wherein said output trace data stream is directed to one of:

- (i) one or more real time trace outputs of an integrated circuit; and
- (ii) a trace data buffer memory of an integrated circuit.

10 27. A method as claimed in claim 15, wherein said trace data source identifier comprises a reserved sequence that is distinguishable from any trace data sequences associated with said selected trace data stream in said output trace data stream.

15 28. A method as claimed in claim 15, wherein said formatting includes detecting an occurrence of a trace data sequence corresponding to said reserved sequence in at least one of said individual trace data streams and upon detection of said reserved sequence, modifying said trace data sequence to distinguish it from said reserved sequence in said output trace data stream.

20 29. Apparatus for analysing trace data, said apparatus comprising:
a trace data receiver operable to receive an output trace data stream generated by an apparatus for data processing containing a plurality of trace data sources;
a trace data parser operable to parse said output trace data stream to detect a trace data source identifier within said output trace data stream; and
25 trace data mapper responsive to a detected trace data source identifier to associate trace data within said output trace data stream with a trace data source of said apparatus for data processing as indicated by said detected trace data source identifier.

30 30. Apparatus as claimed in claim 29, wherein said trace data source identifier is inserted at a predetermined source identifier position within said output trace data stream when a change of trace data source occurs.

31. Apparatus as claimed in claim 30, wherein said predetermined source identifier position contains trace data when said trace data source identifier is not inserted.

5 32. Apparatus as claimed in claim 31, wherein a flag at a predetermined flag position within said output trace data stream indicates whether said predetermined source identifier position contains:

- (i) said trace data source identifier; or
- (ii) trace data.

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33. Apparatus as claimed in claim 30, wherein when said predetermined source identifier position contains said trace data source identifier, then a further predetermined position within said output trace data stream contains a position flag indicating where trace data for said trace data source identified by said trace data
15 source identifier starts within said output trace data stream.

34. Apparatus as claimed in claim 33, wherein when said trace data source identifier is not inserted, said predetermined source identifier position contains trace data and said further predetermined position contains trace data.

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35. Apparatus as claimed in claim 29, wherein said output trace data stream is formatted into data frames, each data frame comprising:

a plurality of predetermined positions respectively containing one of:

(i) a trace data source identifier; and

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(ii) trace data; and

a plurality of predetermined positions containing trace data.

36. Apparatus as claimed in claim 35, wherein each data frame includes a flags portion containing at least one of:

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(i) one or more position flags indicating respective start positions of trace data within said frame associated with trace data source identifiers within said data frame; and

(ii) trace data.

37. Apparatus as claimed in claim 29, wherein a trace data source identifier having a reserved synchronisation value serves as a synchronisation marker within said output trace data stream.

5 38. Apparatus as claimed in claim 29, wherein a trace data source identifier having a reserved null value serves as a null value marker within said output trace data stream indicative of said output trace data stream containing null values.

39. Apparatus as claimed in claim 29, wherein said output trace data stream is
10 read from one of:
(i) one or more real time trace outputs of an integrated circuit; and
(ii) a trace data buffer memory of an integrated circuit.

40. An apparatus as claimed in claim 29, wherein said trace data source identifier
15 comprises a reserved sequence that is distinguishable from trace data originating from one of said plurality of trace data sources.

41. A computer program product carrying a computer program operable to control a computer to act as an apparatus for analysing trace data as claimed in claim 29.